

(FILE 'USPAT' ENTERED AT 13:57:50 ON 22 SEP 1999)

L1	7802 S	CHEMICAL SYNTHESI?
L2	435 S	L1(3A) (PROTEIN? OR POLYPEPTIDE?)
L3	26 S	DHH
L4	5 S	DESERT HEDGEHOG
L5	4 S	L3 AND DESERT
L6	5 S	L4 OR L5
L7	1 S	L4(8A) (HUMAN OR HOMO)

FILE 'MEDLINE' ENTERED AT 13:49:05 ON 17 SEP 1999

FILE LAST UPDATED: 13 SEP 1999 (19990913/UP). FILE COVERS 1960 TO DATE.

MEDLINE has been reloaded to reflect the annual MeSH changes made by the National Library of Medicine for 1999. Enter HELP RLOAD for details.

OLDMEDLINE, data from 1960 through 1965 from the Cumulated Index Medicus (CIM), has been added to MEDLINE. See HELP CONTENT for details.

Left, right, and simultaneous left and right truncation are available in the Basic Index. See HELP SFIELDS for details.

THIS FILE CONTAINS CAS REGISTRY NUMBERS FOR EASY AND ACCURATE SUBSTANCE IDENTIFICATION.

=> s human(8a)(hedgehog or Dhh)

```
        6684886 HUMAN
          1274 HEDGEHOG
            18 DHH
L4         28 HUMAN(8A) (HEDGEHOG OR DHH)
```

=> s l4 and desert

```
        2184 DESERT
L5         1 L4 AND DESERT
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LOCUS (LOC): HSU59748 GenBank (R)
 GenBank ACC. NO. (GBN): U59748
 CAS REGISTRY NO. (RN): 178296-28-1
 SEQUENCE LENGTH (SQL): 285
 5 MOLECULE TYPE (CI): mRNA; linear
 DIVISION CODE (CI): Primates
 DATE (DATE): 4 Jul 1996
 DEFINITION (DEF): ***Human*** ***desert*** ***hedgehog***
 (hDHH) mRNA, partial cds.
 10 SOURCE: ***human***
 ORGANISM (ORGN): ***Homo sapiens***
 Eukaryotae; mitochondrial eukaryotes; Metazoa;
 Chordata; Vertebrata; Eutheria; Primates; Catarrhini;
 Hominidae; ***Homo***
 15 NUCLEIC ACID COUNT (NA): 62 a 73 c 92 g 58 t
 REFERENCE: 1 (bases 1 to 285)
 AUTHOR (AU): Drummond, I.A.
 TITLE (TI): ***Human*** ***desert*** ***hedgehog***
 JOURNAL (SO): Unpublished
 20 REFERENCE: 2 (bases 1 to 285)
 AUTHOR (AU): Drummond, I.A.
 TITLE (TI): Direct Submission
 JOURNAL (SO): Submitted (02-JUN-1996) Renal Unit, Mass. General
 Hospital, 149 13th street, Charlestown, MA 02129, USA
 25 FEATURES (FEAT):

Feature Key	Location	Qualifier
source	1..285	/organism="Homo sapiens"
		/tissue-type="kidney"
		/dev-stage="15 week fetus"
gene	1..285	/gene="hDHH"
CDS	<1..>285	/gene="hDHH"
		/note="secreted protein"
		/codon-start=3
		/product="desert hedgehog"

/db-xref="PID:g1401272"

/translation="IIFKDEENSGADRLMTERCK

ERVNALAIAVMNMWPGVRLRVTEG

WDEDGHHAQDSLHYEGRALDITTSRDRNKYGLL

ARLAVEAGFDWVYYGS"

5

SEQUENCE (SEQ) :

1 atattatattt taaggatgaa gagaacagtg gagccgaccg cctgatgacc gagcgttgta
61 aggagcgggt gaacgctttg gccattgccg tgatgaacat gtggcccgga gtgcgcctac
10 121 gagtgactga gggctgggac gaggacggcc accacgctca ggattcactc cactacgaag
181 gccgtgcttt ggacatcact acgtctgacc gcgaccgcaa caagtatggg ttgctggcgc
241 gcctcgcagt ggaagccggc tttgactggg tctactacgg atccg

GN HEDGEHOG.
 OS HOMO SAPIENS (HUMAN).
 OC EUKARYOTA; METAZOA; CHORDATA; VERTEBRATA; MAMMALIA; EUTHERIA; PRIMATES;
 OC CATARRHINI; HOMINIDAE; HOMO.
 RN [1]
 RP SEQUENCE FROM N.A.
 RA TATE G., ENDO Y., MITSUYA T.;
 RL SUBMITTED (FEB-1998) TO EMBL/GENBANK/DDBJ DATA BANKS.
 DR EMBL; AB010994; D1025788; -.
 DR EMBL; AB010581; D1025788; JOINED.
 DR EMBL; AB010993; D1025788; JOINED.
 SQ SEQUENCE 396 AA; 43577 MW; 8200C40F CRC32;

Query Match 99.7%; Score 1800; DB 2; Length 396;
 Best Local Similarity 99.5%; Pred. No. 1.5e-159;
 Matches 372; Conservative 2; Mismatches 0; Indels 0; Gaps 0;

Qy	1	CGPGRGPVGRRRYARKQLVPLLYKQFVPGVPERTLGASGPAEGRVARGSERFRDLVPNYN	60
Db	23	CGPGRGPVGRRRYARKQLVPLLYKQFVPGVPERTLGASGPAEGRVARGSERFRDLVPNYN	82
Qy	61	PDIIFKDEENSGADRLMTERCKERVNALAIAMNMWPGVRLRVTEGWDEDEGHHAQDSLHY	120
Db	83	PDIIFKDEENSGADRLMTERCKERVNALAIAMNMWPGVRLRVTEGWDEDEGHHAQDSLHY	142
Qy	121	EGRALDITTSDDRDRNKYGLLARLAVEAGFDWVYYESRNHIHVSVKADNSLAVRAGGCFPG	180
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Db	143	EGRALDITTSDDRDRNKYGLLARLAVEAGFDWVYYESRNHVHVSVKADNSLAVRAGGCFPG	202
Qy	181	NATVRLWSGERKGLRELHRGDWVLTADASGRVVPTPVLLFLDRDLQRRASFVAVETEWPP	240
		:	
Db	203	NATVRLWSGERKGLRELHRGDWVLAADASGRVVPTPVLLFLDRDLQRRASFVAVETEWPP	262
Qy	241	RKLLLLTPWHLVFAARGPAPAPGDFAPVFARRLRAGDSVLAPGGDALRPARVARVAREEAV	300
Db	263	RKLLLLTPWHLVFAARGPAPAPGDFAPVFARRLRAGDSVLAPGGDALRPARVARVAREEAV	322
Qy	301	GVFAPLTAHGTLVNDVLASCYAVLESHQWAHRAFAPLRLHALGALLPGGAVQPTGMHW	360
Db	323	GVFAPLTAHGTLVNDVLASCYAVLESHQWAHRAFAPLRLHALGALLPGGAVQPTGMHW	382
Qy	361	YSRLLYRLAEELLG	374
Db	383	YSRLLYRLAEELLG	396

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; Patent No. 5789543: COMPARISON TO SEQ ID NO:3
; GENERAL INFORMATION:
; APPLICANT: Ingham, Phillip W.
; APPLICANT: McMahon, Andrew P.
; APPLICANT: Tabin, Clifford J.
; TITLE OF INVENTION: Vertebrate Embryonic Pattern-Inducing
; TITLE OF INVENTION: Proteins and Uses Related Thereto
; CURRENT APPLICATION DATA:
; APPLICATION NUMBER: US/08/176,427B
; FILING DATE: 30-DEC-1993
; INFORMATION FOR SEQ ID NO: 4:
; SEQUENCE CHARACTERISTICS:
; LENGTH: 396 amino acids
; TYPE: amino acid
; TOPOLOGY: linear
; MOLECULE TYPE: protein
US-08-176-427B-4
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Query Match          96.8%; Score 1851; DB 2; Length 396;
Best Local Similarity 96.5%; Pred. No. 5.6e-202;
Matches 382; Conservative 12; Mismatches 2; Indels 0; Gaps 0;
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Qy      1 MALLTNLLPLCCLALLALPAQSCGPGRGPGVGRRRYARKQLVPLLYKQFVPGVPERTLGAS 60
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Db      1 MALPASLLPLCCLALLALSAQSCGPGRGPGVGRRRYVRKQLVPLLYKQFVPSMPERTLGAS 60

Qy     61 GPAEGRVARGSERFRDLVPNYPNDIIFKDEENSGADRLMTERCKERVNALAIAMNMWPG 120
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Db     61 GPAEGRVTRGSEFRDLVPNYPNDIIFKDEENSGADRLMTERCKERVNALAIAMNMWPG 120

Qy    121 VRLRVTEGWDEDGHHQAQDSLHYEGRALDITTSRDRNKYGLLARLAVEAGFDWVYYESRN 180
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Db    121 VRLRVTEGWDEDGHHQAQDSLHYEGRALDITTSRDRNKYGLLARLAVEAGFDWVYYESRN 180

Qy    181 HIHVSVKADNSLAVRAGGCFPGNATVRLWSEGERKGLRELHRGDWVLTADASGRVVPTPVL 240
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Db    181 HIHVSVKADNSLAVRAGGCFPGNATVRLRSEGERKGLRELHRGDWVLAADAAGRNVPTPVL 240

Qy    241 LFLDRDLQRRASFVAVETEWPPRKLTLTPWHLVFAARGPAPAPGDFAPVFARRLRAGDSV 300
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Db    241 LFLDRDLQRRASFVAVETERPPRKLTLTPWHLVFAARGPAPAPGDFAPVFARRLRAGDSV 300

Qy    301 LAPGGDALRPARVARVAREEAVGVFAPLTAHGTLLVNDVLASCYAVLESHQWAHRAFAPL 360
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Db    301 LAPGGDALQPARVARVAREEAVGVFAPLTAHGTLLVNDVLASCYAVLESHQWAHRAFAPL 360

Qy    361 RLLHALGALLPGGAVQPTGMHWYSRLLYRLAEELG 396
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AC 043323; COMPARISON TO SEQ ID NO:3
 DT 01-JUN-1998 (TREMBLREL. 06, CREATED)
 DT 01-JUN-1998 (TREMBLREL. 06, LAST SEQUENCE UPDATE)
 DT 01-JUN-1998 (TREMBLREL. 06, LAST ANNOTATION UPDATE)
 DE HEDGEHOG.
 GN HEDGEHOG.
 OS HOMO SAPIENS (HUMAN).
 OC EUKARYOTA; METAZOA; CHORDATA; VERTEBRATA; MAMMALIA; EUTHERIA; PRIMATES;
 OC CATARRHINI; HOMINIDAE; HOMO.
 RN [1]
 RP SEQUENCE FROM N.A.
 RA TATE G., ENDO Y., MITSUYA T.;
 RL SUBMITTED (FEB-1998) TO EMBL/GENBANK/DDBJ DATA BANKS.
 DR EMBL; AB010994; D1025788; -.
 DR EMBL; AB010581; D1025788; JOINED.
 DR EMBL; AB010993; D1025788; JOINED.
 SQ SEQUENCE 396 AA; 43577 MW; 8200C40F CRC32;

Query Match 99.7%; Score 1908; DB 2; Length 396;
 Best Local Similarity 99.5%; Pred. No. 2.4e-168;
 Matches 394; Conservative 2; Mismatches 0; Indels 0; Gaps 0;

Qy 1 MALLTNLLPLCCLALLALPAQSCGPGRGPGVRRRYARKQLVPLLYKQFVPGVPERTLGAS 60
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 Db 1 MALLTNLLPLCCLALLALPAQSCGPGRGPGVRRRYARKQLVPLLYKQFVPGVPERTLGAS 60

Qy 61 GPAEGRVARGSERFRDLVPNYNPDIIFKDEENSGADRLMTERCKERVNALAIAVMNMWPG 120
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 Db 61 GPAEGRVARGSERFRDLVPNYNPDIIFKDEENSGADRLMTERCKERVNALAIAVMNMWPG 120

Qy 121 VRLRVTEGWDEDGHHQAQDSLHYEGRALDITTSRDRNKYGLLARLAVEAGFDWVYYESRN 180
 |||
 Db 121 VRLRVTEGWDEDGHHQAQDSLHYEGRALDITTSRDRNKYGLLARLAVEAGFDWVYYESRN 180

Qy 181 HIHVSVKADNSLAVRAGGCFPGNATVRLWSGERKGLRELHRGDWVLTADASGRVVPTPVL 240
 |:|
 Db 181 HVHVSVKADNSLAVRAGGCFPGNATVRLWSGERKGLRELHRGDWVLAADASGRVVPTPVL 240

Qy 241 LFLDRDLQRRASFVAVETEWPPRKLLLPWHLVFAARGPAPAPGDFAPVFARRLRAGDSV 300
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 Db 241 LFLDRDLQRRASFVAVETEWPPRKLLLPWHLVFAARGPAPAPGDFAPVFARRLRAGDSV 300

Qy 301 LAPGGDALRPARVARVAREEAVGVFAPLTAHGTLLVNDVLASCYAVLESHQWAHRAFAPL 360
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 Db 301 LAPGGDALRPARVARVAREEAVGVFAPLTAHGTLLVNDVLASCYAVLESHQWAHRAFAPL 360

Qy 361 RLLHALGALLPGGAVQPTGMHWYSRLLYRLAEELG 396
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 Db 361 RLLHALGALLPGGAVQPTGMHWYSRLLYRLAEELG 396

LOCUS (LOC): AI666359 GenBank (R)
GenBank ACC. NO. (GBN): AI666359
CAS REGISTRY NO. (RN): 232155-01-0
SEQUENCE LENGTH (SQL): 463
MOLECULE TYPE (CI): mRNA; linear
DIVISION CODE (CI): Expressed sequence tag
DATE (DATE): 12 May 1999
DEFINITION (DEF): mullg06.x1 Soares 2NbMT Mus musculus cDNA clone
IMAGE:639130 3' similar to TR:Q61488 Q61488

DESERT HEDGEHOG HOMOLOG

PRECURSOR ;, mRNA sequence.

KEYWORDS (ST): EST
SOURCE: house mouse.
ORGANISM (ORGN): Mus musculus
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata;
Mammalia; Eutheria; Rodentia; Sciurognathi; Muridae;
Murinae; Mus

NUCLEIC ACID COUNT (NA): 87 a 124 c 138 g 113 t 1 others

COMMENT:

Other_ESTs: mullg06.y1

Contact: Marra M/WashU-NCI Mouse EST Project 1999

Washington University School of Medicine

4444 Forest Park Parkway, Box 8501, St. Louis, MO 63108, USA

Tel: 314 286 1800

Fax: 314 286 1810

Email: mouseest@watson.wustl.edu

This clone is available royalty-free through LLNL ; contact the

IMAGE Consortium (info@image.llnl.gov) for further information.

This clone was previously sequenced on the 5' end only, this new
data is from the 3' end

Possible reversed clone: similarity on wrong strand

High quality sequence stop: 261.

REFERENCE: 1 (bases 1 to 463)

AUTHOR (AU): Marra,M.; Hillier,L.; Kucaba,T.; Martin,J.; Beck,C.;
Wyllie,T.; Underwood,K.; Steptoe,M.; Theising,B.;
Allen,M.; Bowers,Y.; Person,B.; Swaller,T.;

Gibbons,M.;

Pape,D.; Harvey,N.; Schurk,R.; Ritter,E.; Kohn,S.;

Shin,T.; Jackson,Y.; Cardenas,M.; McCann,R.;

Waterston,R.; Wilson,R.

TITLE (TI): The WashU-NCI Mouse EST Project 1999

JOURNAL (SO): Unpublished (1999)

FEATURES (FEAT):

Feature Key	Location	Qualifier
source	1..463	/organism="Mus musculus" /strain="C57BL/6J" /note="Vector: pT7T3D-Pac (Pharmacia) with a modified polylinker; Site-1: Not I; Site-2: Eco RI; 1st strand cDNA was primed with a Not I - oligo(dT) primer [5' TGTTACCAATCTGAAGTGGGAGCGGCCGCGTTTT TTTTTTTTTTTTTTTTTTTTTTT 3']";

double-stranded cDNA was ligated to Eco RI adapters (Pharmacia), digested with Not I and cloned into the Not I and Eco RI sites of the modified pT7T3 vector. RNA provided by Dr. Bertrand Jordan. Library went through two rounds of normalization, and was constructed by Bento Soares and M. Fatima Bonaldo."

/db-xref="taxon:10090"
/clone="IMAGE:639130"
/clone-lib="Soares 2NbMT"
/sex="male"
/tissue-type="Thymus"
/dev-stage="4 weeks"
/lab-host="DH10B"

SEQUENCE (SEQ):

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121 tgggtggtgtg gtagagcagg tggggagaaa ctctccttac ctctgtcatc agcggtctg
181 cgccgctggt ctcctcatcc ttgaagatta tgtcgggggt gtagttgggt acgaggtccc
241 ggaagcgctc cgacccctt gttaccctcc cctccgctgg cccactcgcg cccagggtcc
301 gctcgggcat actgggcaca aactgcttgc atagcagagg cacaagttgc ttgcgcacat
361 tacgccgncg gccaccggg tctcgcccg gccgcagct ctgggcagat agtgccaaga
421 gtgccaagca gcacaggggc aacagactgg cccgcagagc cat
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L3 ANSWER 2 OF 8 GENBANK.RTM. COPYRIGHT 1999

LOCUS (LOC): AI645932 GenBank (R)
GenBank ACC. NO. (GBN): AI645932
CAS REGISTRY NO. (RN): 231418-84-1
SEQUENCE LENGTH (SQL): 537
MOLECULE TYPE (CI): mRNA; linear
DIVISION CODE (CI): Expressed sequence tag
DATE (DATE): 29 Apr 1999
DEFINITION (DEF): mullg06.y1 Soares 2NbMT Mus musculus cDNA clone
IMAGE:639130 5' similar to TR:Q61488 Q61488

DESERT HEDGEHOG HOMOLOG

PRECURSOR ;, mRNA sequence.

KEYWORDS (ST): EST
SOURCE: house mouse.
ORGANISM (ORGN): Mus musculus
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata;
Mammalia; Eutheria; Rodentia; Sciurognathi; Muridae;
Murinae; Mus

NUCLEIC ACID COUNT (NA): 107 a 159 c 164 g 107 t
COMMENT:

Contact: Marra M/WashU-NCI Mouse EST Project 1999
Washington University School of Medicine
4444 Forest Park Parkway, Box 8501, St. Louis, MO 63108, USA
Tel: 314 286 1800
Fax: 314 286 1810
Email: mouseest@watson.wustl.edu
This clone is available royalty-free through LLNL ; contact the
IMAGE Consortium (info@image.llnl.gov) for further information.
This read is a RESEQUENCE of a previously sequenced mouse clone
This read has been verified (found to hit its original self in the
correct orientation)
Possible reversed clone: similarity on wrong strand
Seq primer: -40RP from Gibco
High quality sequence stop: 478.

REFERENCE: 1 (bases 1 to 537)
AUTHOR (AU): Marra,M.; Hillier,L.; Kucaba,T.; Martin,J.; Beck,C.;

Gibbons,M.;

Wyllie,T.; Underwood,K.; Steele,M.; Theising,B.;
Allen,M.; Bowers,Y.; Person,M.; Swaller,T.;

Pape,D.; Harvey,N.; Schurk,R.; Ritter,E.; Kohn,S.;
Shin,T.; Jackson,Y.; Cardenas,M.; McCann,R.;
Waterston,R.; Wilson,R.

TITLE (TI): The WashU-NCI Mouse EST Project 1999
JOURNAL (SO): Unpublished (1999)

FEATURES (FEAT):

Feature Key	Location	Qualifier
source	1..537	/organism="Mus musculus" /strain="C57BL/6J" /note="Vector: pT7T3D-Pac (Pharmacia) with a modified polylinker; Site-1: Not I; Site-2: Eco RI; 1st strand cDNA was primed with a Not I - oligo(dT) primer [5' TGTTACCAATCTGAAGTGGGAGCGGCCGCGTTTT TTTTTTTTTTTTTTTTTTTTTTT 3']; double-stranded cDNA was ligated to Eco RI adaptors (Pharmacia), digested with Not I and cloned into the Not I and Eco RI sites of the modified pT7T3 vector. RNA provided by Dr. Bertrand Jordan. Library went through two rounds of normalization, and was constructed by Bento Soares and M.Fatima Bonaldo." /db-xref="taxon:10090" /clone="IMAGE:639130" /clone-lib="Soares 2NbMT" /sex="male" /tissue-type="Thymus" /dev-stage="4 weeks" /lab-host="DH10B"

SEQUENCE (SEQ):

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121 tactctggga ctttctctat ctgcggtgct ctttagctcc tgcggagatg cccaattgac
181 aggagagcca gtgaggacaa gaacgctccc ttccgacca agtccacggc acccatggct
241 ctgccggcca gtctgttgcc cctgtgctgc ttggcactct tggcactatc tgcccagagc
301 tgcgggccgg gccgaggacc ggttgccgg cggcgttatg tgcgcaagca acttgtgcct
361 ctgctataca agcagtttgt gccagtatg cccgagcgga ccctgtgcgc gagtgggcca
421 gcggagggga gggtaacaag ggggtcggag cgcttccggg acctcgtacc caactacaac
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L3 ANSWER 3 OF 8 GENBANK.RTM. COPYRIGHT 1999

LOCUS (LOC): AB018401 GenBank (R)
GenBank ACC. NO. (GBN): AB018401
CAS REGISTRY NO. (RN): 218090-26-7
SEQUENCE LENGTH (SQL): 1491
MOLECULE TYPE (CI): DNA; linear
DIVISION CODE (CI): Primates
DATE (DATE): 13 Oct 1998
DEFINITION (DEF): **Homo sapiens** hedgehog gene, exon 1.
KEYWORDS (ST): hedgehog
SOURCE: **Homo sapiens** DNA.
ORGANISM (ORGN): **Homo sapiens**
Eukaryota; Metazoa; Chordata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; **Homo**
 NUCLEIC ACID COUNT): 345 a 369 c 490 g 28 t
 REFERENCE: 1 (bases 1 to 1491)
 AUTHOR (AU): Tate, G.; Endo, Y.; Mitsuya, T.
 TITLE (TI): **Human desert hedgehog**
 gene
 JOURNAL (SO): Published Only in DataBase (1998) In press
 REFERENCE: 2 (bases 1 to 1491)
 AUTHOR (AU): Tate, G.; Endo, Y.; Mitsuya, T.
 TITLE (TI): Direct Submission
 JOURNAL (SO): Submitted (04-OCT-1998) to the DDBJ/EMBL/GenBank
 databases. Genshu Tate, Showa University Fujigaoka
 Hospital, Department of Surgical Pathology; Fujigaoka
 1-30, Aoba-ku, Yokohama, Kanagawa 227-8501, Japan
 (E-mail:six10352@super.win.or.jp, Tel:81-45-974-6632,
 Fax:81-45-972-6242)

FEATURES (FEAT):

Feature Key	Location	Qualifier
source	1..1491	/organism="Homo sapiens"
gene	1171..1473	/db-xref="taxon:9606"
exon	1171..1473	/gene="hedgehog"
		/number=1

SEQUENCE (SEQ):

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121 ggagccccgg gagtccagag agggagaaag ctggagaggt gcctagatgg acgggttaagg
181 gaagtgatcc tcacctctta caaagacttt tgagtgtcca ctgcccttca gcagcttcca
241 actgagaagt cattcatttg aaaaacagca gctattagat gcctggcaaa gaagagaagg
301 ggaaaaaagt tggaagtcct aaatgagaca ataagtacca agctctgttc ctggttctgg
361 ggaagtcca aagagagactg caaagttagt agagaaatgg gcccttggtg tcctcacctc
421 ccagtcctgc ttaatgctga atgtgaggag agatggaagt cggggagatc tggggaggac
481 tacagagaag ggaggctctg gttgtatgcc caaagggtt ggctggtctt gggcagaaat
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L3 ANSWER 4 OF 8 GENBANK.RTM. COPYRIGHT 1999

LOCUS (LOC): AB010581S3 GenBank (R)
 GenBank ACC. NO. (GBN): AB010994
 CAS REGISTRY NO. (RN): 204280-14-8
 SEQUENCE LENGTH (SQL): 626
 MOLECULE TYPE (CI): DNA; linear
 DIVISION CODE (CI): Primates
 DATE (DATE): 14 Feb 1998
 DEFINITION (DEF): **Homo sapiens** hedgehog gene, exon 3 and
 complete cds.
 KEYWORDS (ST): hedgehog

SEGMENT: 3 of 3
 SOURCE: Homo sapiens DNA.
 ORGANISM (ORGN): Homo sapiens
 Eukaryotae; Metazoa; Chordata; Vertebrata; Mammalia;
 Eutheria; Primates; Catarrhini; Hominidae; Homo
 NUCLEIC ACID COUNT (NA): 73 a 200 c 236 g 117 t
 REFERENCE: 1 (bases 1 to 626)
 AUTHOR (AU): Tate, G.; Endo, Y.; Mitsuya, T.
 TITLE (TI): Human Desert Hedgehog,
 third exon
 JOURNAL (SO): Published Only in DataBase (1998) In press
 REFERENCE: 2 (bases 1 to 626)
 AUTHOR (AU): Tate, G.; Endo, Y.; Mitsuya, T.
 TITLE (TI): Direct Submission
 JOURNAL (SO): Submitted (09-FEB-1998) to the DDBJ/EMBL/GenBank
 databases. Genshu Tate, Showa University Fujigaoka
 Hospital, Department of Surgical Pathology; Fujigaoka
 1-30, Aoba-ku, Yokohama, Kanagawa 227-8501, Japan
 (E-mail:six10352@super.win.or.jp, Tel:81-45-974-6632,
 Fax:81-45-972-6242)

FEATURES (FEAT):

Feature Key	Location	Qualifier
source	1..626	/organism="Homo sapiens" /db-xref="taxon:9606"
gene	join(AB010581:1..303, AB010993:1..262,1..626)	/gene="hedgehog"
CDS	join(AB010581:1..303, AB010993:1..262,1..626)	/gene="hedgehog" /codon-start=1 /db-xref="PID:d1025788" /db-xref="PID:g2887457" /translation="MALLTNLLPLCCLALLALPA QSCGPGRGPVGRRRYARKQLVPLL YKQFVPGVPERTLGASGPAEGRVARGSERFRDLV PNYNPDIIFKDEENSGADRLMTER CKERVNALAIAVMNMWPGVRLRVTEGWDEDGHA QDSLHYEGRALDITTSRDRNKYG LLARLAVEAGFDWVYYESRNVHVSVKADNSLAV RAGGCFPGNATVRLWSGERKGLRE LHRGDWVLAADASGRVVPTPVLLFLDRDLQRRAS FVAVETEWPPRLLLLTPWHLVFAA RGPAPAPGDFAPVFARRLRAGDSVLAPGGDALRP ARVARVAREEAVGVFAPLTAHGT LVNDVLASCYAVLESHQWAHRAFAPIRLHALGA LLPGGAVQPTGMHWYSRLLYRLAE ELLG"
exon	1..626	/gene="hedgehog" /number=3

SEQUENCE (SEQ):

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1  ataactcact  gccggtccgg  gccggcggct  gctttccggg  aaatgcaact  gtgcgcctgt
61  ggagcggcga  gccgaaaggg  ctgcgggaac  tgcaccgcgg  agactgggtt  ttggcggccg
121  atgcgtcagg  ccgggtgggt  cccacgccgg  tgctgctctt  cctggaccgg  gacttgcagc
181  gccgggcttc  atttgtggct  gtggagaccg  agtggcctcc  acgcaaaactg  ttgctcacgc
241  cctggcacct  ggtgtttgcc  gctcgagggc  cggcgccccg  gccaggcgac  tttgcaccgg
301  tgttcgcgcg  ccggctacgc  gctggggact  cggtgctggc  gcccggcggg  gatgcgcttc
361  ggccagcgcg  cgtggcccgt  gtggcgcggg  aggaagccgt  gggcgtgttc  gcgccgctca
421  ccgcgcacgg  gacgctgctg  gtgaacgatg  tcctggcctc  ttgctacgcg  gttctggaga
481  gtcaccagtg  gccgcaccgc  gcttttgccc  ccttgagact  gctgcacgcg  ctaggggcgc
541  tgctccccgg  cggggccgtc  cagccgactg  gcatgcattg  gtactctcgg  ctctctacc
601  gcttagcgga  ggagctactg  ggctga
  
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LOCUS (LOC): AB010581S2 GenBank (R)
 GenBank ACC. NO. (GB): AB010993
 CAS REGISTRY NO. (RN): 204280-13-7
 SEQUENCE LENGTH (SQL): 262
 MOLECULE TYPE (CI): DNA; linear
 DIVISION CODE (CI): Primates
 DATE (DATE): 14 Feb 1998
 DEFINITION (DEF): **Homo sapiens** hedgehog gene, exon 2.
 KEYWORDS (ST): hedgehog
 SEGMENT: 2 of 3
 SOURCE: **Homo sapiens** DNA.
 ORGANISM (ORGN): **Homo sapiens**
 Eukaryotae; Metazoa; Chordata; Vertebrata; Mammalia;
 Eutheria; Primates; Catarrhini; Hominidae; **Homo**
 NUCLEIC ACID COUNT (NA): 52 a 76 c 84 g 50 t
 REFERENCE:
 1 (bases 1 to 262)
 AUTHOR (AU): Tate, G.; Endo, Y.; Mitsuya, T.
 TITLE (TI): **Human Desert Hedgehog**,
 second exon
 JOURNAL (SO): Published Only in DataBase (1998) In press
 REFERENCE:
 2 (bases 1 to 262)
 AUTHOR (AU): Tate, G.; Endo, Y.; Mitsuya, T.
 TITLE (TI): Direct Submission
 JOURNAL (SO): Submitted (09-FEB-1998) to the DDBJ/EMBL/GenBank
 databases. Genshu Tate, Showa University Fujigaoka
 Hospital, Department of Surgical Pathology; Fujigaoka
 1-30, Aoba-ku, Yokohama, Kanagawa 227-8501, Japan
 (E-mail:six10352@super.win.or.jp, Tel:81-45-974-6632,
 Fax:81-45-972-6242)

FEATURES (FEAT):

Feature Key	Location	Qualifier
source	1..262	/organism="Homo sapiens" /db-xref="taxon:9606"
exon	1..262	/gene="hedgehog" /number=2

SEQUENCE (SEQ):

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1 cggtgtaagg agcgggtgaa cgctttggcc attgccgtga tgaacatgtg gcccggagtg
61 cgcctacgag tgactgaggg ctgggacgag gacggccacc acgctcagga ttcactccac
121 tacgaaggcc gtgctttgga catcactacg tctgaccgag accgcaacaa gtatggggttg
181 ctggcgcgcc tcgcagtgga agccggcttc gactgggtct actacgagtc ccgcaaccac
241 gtccacgtgt cggtc aaagc tg
  
```

L3 ANSWER 6 OF 8 GENBANK.RTM. COPYRIGHT 1999

LOCUS (LOC): AB010581S1 GenBank (R)
 GenBank ACC. NO. (GB): AB010581
 CAS REGISTRY NO. (RN): 202961-68-0
 SEQUENCE LENGTH (SQL): 303
 MOLECULE TYPE (CI): DNA; linear
 DIVISION CODE (CI): Primates
 DATE (DATE): 14 Feb 1998
 DEFINITION (DEF): **Homo sapiens** hedgehog gene, exon 1.
 KEYWORDS (ST): hedgehog
 SEGMENT: 1 of 3
 SOURCE: **Homo sapiens** DNA.
 ORGANISM (ORGN): **Homo sapiens**
 Eukaryotae; Metazoa; Chordata; Vertebrata; Mammalia;
 Eutheria; Primates; Catarrhini; Hominidae; **Homo**
 NUCLEIC ACID COUNT (NA): 51 a 100 c 104 g 48 t
 REFERENCE:
 1 (bases 1 to 303)
 AUTHOR (AU): Tate, G.; Endo, Y.; Mitsuya, T.
 TITLE (TI): **Human Desert Hedgehog**,

first exon
 JOURNAL (SO): Published Only in DataBase (8) In press
 REFERENCE: 2 (bases 1 to 303)
 AUTHOR (AU): Tate, G.; Endo, Y.; Mitsuya, T.
 TITLE (TI): Direct Submission
 JOURNAL (SO): Submitted (20-JAN-1998) to the DDBJ/EMBL/GenBank
 databases. Genshu Tate, Showa University Fujigaoka
 Hospital, Department of Surgical Pathology; Fujigaoka
 1-30, Aoba-ku, Yokohama, Kanagawa 227-8501, Japan
 (E-mail:six10352@super.win.or.jp, Tel:81-45-974-6632,
 Fax:81-45-972-6242)

FEATURES (FEAT):

Feature Key	Location	Qualifier
source	1..303	/organism="Homo sapiens" /db-xref="taxon:9606"
exon	1..303	/gene="hedgehog" /number=1

SEQUENCE (SEQ):

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1 atggctctcc tgaccaatct actgcccctg tgctgcttgg cacttctggc gctgccagcc
61 cagagctgcg ggccgggccc ggggccggtt ggccggcgcc gctatgcgcg caagcagctc
121 gtgccgctac tctacaagca atttgtgccc ggcgtgccag agcggaccct gggcgccagt
181 gggccagcgg aggggagggg ggcaaggggg tccgagcgct tccgggacct cgtgccaac
241 tacaaccccc acatcatctt caaggatgag gagaacagtg gagccgaccg cctgatgacc
301 gag

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L3 ANSWER 7 OF 8 GENBANK.RTM. COPYRIGHT 1999

LOCUS (LOC): AA064660 GenBank (R)
 GenBank ACC. NO. (GBN): AA064660
 CAS REGISTRY NO. (RN): 181404-26-2
 SEQUENCE LENGTH (SQL): 314
 MOLECULE TYPE (CI): mRNA; linear
 DIVISION CODE (CI): Expressed sequence tag
 DATE (DATE): 23 Dec 1997
 DEFINITION (DEF): zml3f08.sl Stratagene pancreas (#937208) **Homo**
 sapiens cDNA clone 525543 3' similar to TR:G443942
 G443942 **DESERT HEDGEHOG** PRECURSOR.
 ;.
 KEYWORDS (ST): EST
 SOURCE: **human.**
 ORGANISM (ORGN): **Homo sapiens**
 Eukaryotae; Metazoa; Chordata; Vertebrata; Mammalia;
 Eutheria; Primates; Catarrhini; Hominidae; **Homo**
 NUCLEIC ACID COUNT (NA): 31 a 100 c 117 g 55 t 11 others
 COMMENT:

Contact: Wilson RK
 Washington University School of Medicine
 4444 Forest Park Parkway, Box 8501, St. Louis, MO 63108
 Tel: 314 286 1800
 Fax: 314 286 1810
 Email: est@watson.wustl.edu

WARNING: There is evidence that suggests that the 384-well parent
 plate of this clone contains both **human** and mouse derived
 clones.

Thus, the origin of this clone is uncertain. This caution should be
 kept in mind should you use this clone.

This clone is available royalty-free through LLNL ; contact the
 IMAGE Consortium (info@image.llnl.gov) for further information.

Possible reversed clone: similarity on wrong strand

Possible reversed clone: polyT not found

Insert Length: 862 Std Error: 0.00

Seq primer: -40M13 fwd. from Amersham

High quality sequence stop: 283.
REFERENCE: 1 (bases 1 to 314)
AUTHOR (AU): Hillier, L.; Clark, N.; Dubuque, T.; Elliston, K.;
Hawkins, M.; Holman, M.; Hultman, M.; Kucaba, T.; Le, M.;
Lennon, G.; Marra, M.; Parsons, J.; Rifkin, L.;
Rohlfing, T.; Tan, F.; Trevaskis, E.; Waterston, R.;
Williamson, A.; Wohldmann, P.; Wilson, R.
TITLE (TI): WashU-Merck EST Project
JOURNAL (SO): Unpublished (1995)

FEATURES (FEAT):

Feature Key	Location	Qualifier
source	1..314	/organism="Homo sapiens" /organ="Organ: pancreas; Vector: pBluescript SK-; Site-1: EcoRI; Site-2: XhoI; Cloned unidirectionally. Primer: Oligo dT. Pancreatic adenocarcinoma cell line. Average insert size: 1.0 kb; Uni-ZAP XR Vector; ~5' adaptor sequence: 5' GAATTCGGCACCAG 3' ~3' adaptor sequence: 5' CTCGAGTTTTTTTTTTTTTTTTTTT /db-xref="GDB:3916972" /db-xref="taxon:9606" /clone="525543" /clone-lib="Stratagene pancreas (#937208)" /lab-host="SOLR cells (kanamycin resistant)"

SEQUENCE (SEQ):

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1  ggccggcnc  ggcagngng  anntttgca  cgggtgttc  gcgccggct  cgctnnggg
61  actcgggtg  ggcgcccg  ggggatg  ttcggccag  gcgcgtgg  cgtgtggcg
121  gggaggaag  cgtggngt  ttcgcgcc  tcaccgcgc  cgggacgct  ctggtgaac
181  atgtcctgg  ctcttgct  gcggttct  agagtcacca  gtgggcgc  cgctntttg
241  ccccttgag  actgctgc  gcgctagg  cntgctccc  ggcgggcc  ccagccgac
301  ggaatgcatt  tngg

```

L3 ANSWER 8 OF 8. GENBANK.RTM. COPYRIGHT 1999

LOCUS (LOC): HSU59748 GenBank (R)
GenBank ACC. NO. (GBN): U59748
CAS REGISTRY NO. (RN): 178296-28-1
SEQUENCE LENGTH (SQL): 285
MOLECULE TYPE (CI): mRNA; linear
DIVISION CODE (CI): Primates
DATE (DATE): 4 Jul 1996
DEFINITION (DEF): **Human desert hedgehog**
(hDHH) mRNA, partial cds.
SOURCE: **human.**
ORGANISM (ORGN): **Homo sapiens**
Eukaryotae; mitochondrial eukaryotes; Metazoa;
Chordata; Vertebrata; Eutheria; Primates; Catarrhini;
Hominidae; **Homo**
NUCLEIC ACID COUNT (NA): 62 a 73 c 92 g 58 t
REFERENCE: 1 (bases 1 to 285)
AUTHOR (AU): Drummond, I.A.
TITLE (TI): **Human desert hedgehog**
JOURNAL (SO): Unpublished
REFERENCE: 2 (bases 1 to 285)
AUTHOR (AU): Drummond, I.A.
TITLE (TI): Direct Submission
JOURNAL (SO): Submitted (02-JUN-1996) Renal Unit, Mass. General

FEATURES (FEAT):

Feature Key	Location	Qualifier
source	1..285	/organism="Homo sapiens" /tissue-type="kidney" /dev-stage="15 week fetus"
gene	1..285	/gene="hDHH"
CDS	<1..>285	/gene="hDHH" /note="secreted protein" /codon-start=3 /product="desert hedgehog" /db-xref="PID:g1401272" /translation="IIFKDEENSGADRLMTERCK ERVNALAIAVMNMWPGVRLRVTEG WDEDGHHAQDSLHYEGRALDITTSRDRNKYGLL ARLAVEAGFDWVYYGS"

SEQUENCE (SEQ):

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1 atattatattt taaggatgaa gagaacagtg gagccgaccg cctgatgacc gagcgttgta
61 aggagcgggt gaacgctttg gccattgccg tgatgaacat gtggcccgga gtgcgcctac
121 gagtgactga gggctgggac gaggacggcc accacgctca ggattcactc cactacgaag
181 gccgtgcttt ggacatcact acgtctgacc gcgaccgcaa caagtatggg ttgctggcgc
241 gcctcgcaat ggaagccggc tttgactggg tctactacgg atccg

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L5 ANSWER 1 OF 1 MEDLINE
AN 1999030620 MEDLINE
DN 99030620
TI Characterization of two patched receptors for the vertebrate hedgehog
protein family.
AU Carpenter D; Stone D M; Brush J; Ryan A; Armanini M; Frantz G; Rosenthal
A; de Sauvage F J
CS Department of Molecular Oncology, Genentech Inc., 1 DNA Way, South San
Francisco, CA 94080, USA.
SO PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF
AMERICA, (1998 Nov 10) 95 (23) 13630-4.
Journal code: PV3. ISSN: 0027-8424.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals; Cancer Journals
OS GENBANK-AF091501
EM 199902
EW 19990204

L5 ANSWER 1 OF 1 MEDLINE

AB The multitransmembrane protein Patched (PTCH) is the receptor for Sonic Hedgehog (Shh), a secreted molecule implicated in the formation of embryonic structures and in tumorigenesis. Current models suggest that binding of Shh to PTCH prevents the normal inhibition of the seven-transmembrane-protein Smoothened (SMO) by PTCH. According to this model, the inhibition of SMO signaling is relieved after mutational inactivation of PTCH in the basal cell nevus syndrome. Recently, PTCH2, a molecule with sequence homology to PTCH, has been identified. To characterize both PTCH molecules with respect to the various **Hedgehog** proteins, we have isolated the **human** PTCH2 gene. Biochemical analysis of PTCH and PTCH2 shows that they both bind to all hedgehog family members with similar affinity and that they can form

a complex with SMO. However, the expression patterns of PTCH and PTCH2 do not fully overlap. While PTCH is expressed throughout the mouse embryo, PTCH2 is found at high levels in the skin and in spermatocytes. Because **Desert** Hedgehog (Dhh) is expressed specifically in the testis and is required for germ cell development, it is likely that PTCH2 mediates its activity in vivo. Chromosomal localization of PTCH2 places it on chromosome 1p33-34, a region deleted in some germ cell tumors, raising the possibility that PTCH2 may be a tumor suppressor in Dhh target cells.

Patent No. 5789543

; GENERAL INFORMATION:

; APPLICANT: Ingham, Phillip W.

; APPLICANT: McMahon, Andrew P.

; APPLICANT: Tabin, Clifford J.

; TITLE OF INVENTION: Vertebrate Embryonic Pattern-Inducing

; TITLE OF INVENTION: Proteins and Uses Related Thereto

; CURRENT APPLICATION DATA:

; APPLICATION NUMBER: US/08/176,427B

; FILING DATE: 30-DEC-1993

; INFORMATION FOR SEQ ID NO: 4:

; SEQUENCE CHARACTERISTICS:

; LENGTH: 396 amino acids

; TYPE: amino acid

; TOPOLOGY: linear

; MOLECULE TYPE: protein

US-08-176-427B-4

Query Match 98.7%; Score 828; DB 2; Length 396;

Best Local Similarity 97.7%; Pred. No. 3.5e-101;

Matches 172; Conservative 3; Mismatches 1; Indels 0; Gaps 0;

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Qy      1 CGPGRGPFVGRRRYARKQLVPLLYKQFVPGVPERTLGASGPAEGRVARGSERFRDLVPNYN 60
          |||:|||||:|||||:|||||:|||||:|||||:|||||:|||||:|||||:|||||:
Db      23 CGPGRGPFVGRRRYVRKQLVPLLYKQFVPSMPERTLGASGPAEGRVTRGSERFRDLVPNYN 82

Qy      61 PDIIFKDEENSGADRLMTERCKERVNALAIAMNMWPGVRLRVTEGWDEDGHHAQDSLHY 120
          |||:|||||:|||||:|||||:|||||:|||||:|||||:|||||:|||||:|||||:
Db      83 PDIIFKDEENSGADRLMTERCKERVNALAIAMNMWPGVRLRVTEGWDEDGHHAQDSLHY 142

Qy     121 EGRALDITTSDRDRNKYGLLARLAVEAGFDWVYYESRNHIHVSVKADNSLAVRAGG 176
          |||:|||||:|||||:|||||:|||||:|||||:|||||:|||||:|||||:|||||:
Db     143 EGRALDITTSDRDRNKYGLLARLAVEAGFDWVYYESRNHIHVSVKADNSLAVRAGG 198
```


ID R77341 standard; Protein; 475 AA.
AC R77341;
DT 14-MAR-1996 (first entry)
DE Human sonic hedgehog protein.
KW Human; sonic hedgehog protein; probe; primer; diagnostic;
KW nervous system disorder; gene therapy; antibody.
OS Homo sapiens.
FH Key Location/Qualifiers
FT peptide 24. .29
FT /note= "conserved sequence (R77349)"
FT misc_difference 463
FT /note= "unspecified amino acid"
PN W09518856-A1.
PD 13-JUL-1995.
PF 30-DEC-1994; U14992.
PR 30-DEC-1993; US-176427.
PR 14-DEC-1994; US-356060.
PA (HARD) HARVARD COLLEGE.
PA (IMCR) IMPERIAL CANCER RES TECHNOLOGY.
PI Ingham PW, McMahon AP, Tabin CJ;
DR WPI; 95-255060/33.
DR N-PSDB; Q91639.
PT Hedgehog-like protein(s) and nucleic acid(s) encoding them - useful
PT to treat degenerative nervous system disorder(s) and in gene
PT therapy.
PS Claim 17; Page 143-45; 210pp; English.
CC The sequence represents a human sonic hedgehog protein, homologous
CC to a Drosophila hedgehog protein (R77337), and is encoded by a cDNA
CC isolated from a human fetal lung cDNA library. Probes and primers
CC derived from the sonic hedgehog gene may be used as diagnostic
CC agents for neuromuscular, autonomic or central nervous system
CC disorders, and the gene may also be used in gene therapy.
CC Antibodies generated from the protein may be used as therapeutic or
CC research reagents.
SQ Sequence 475 AA;

Query Match 79.5%; Score 667; DB 1; Length 475;
Best Local Similarity 75.0%; Pred. No. 3.8e-80;
Matches 132; Conservative 29; Mismatches 13; Indels 2; Gaps 2;

Qy 1 CGPGRGPVGRRRYARKQLVPLLYKQFVPGVPERTLGASGPAEGRVARGSERFRDLVPNYN 60
| | | | | | : | | : | | | | | : | | | | | | | | : | | | : | | |
Db 24 CGPGRG-FGKRRHPKK-LTPLAYKQFIPNVAEKT LGASGRYEGKISRNSERFKELTPNYN 81
Qy 61 PDIIIFKDEENSGADRLMTERCKERVNALAIAMNMWPGVRLRVTEGWDEDGHHAQDSLHY 120
| | | | | | | | : | | | | | : | | : | | | : | | | | | | | | : | | | | | |
Db 82 PDIIIFKDEENTGADRLMTQCKDKLNALAI SVMNQWPGVKLRVTEGWDEDGHHSEESLHY 141
Qy 121 EGRALDITTS DRDRNKYGLLARLAVEAGFDWVYYESRNHIHVSVKADNSLAVRAGG 176
| | | : | | | | | | : | | : | | | | | | | | : | | | | | : | | : | | |
Db 142 EGRAVDITTS DRDRSKYGMLARLAVEAGFDWVYYESKAHIHCSVKAENSVAAKSGG 197

```

; Patent No. 5759811
; GENERAL INFORMATION:
; APPLICANT: Epstein, Ervin
; APPLICANT: Hu, Zhilan
; APPLICANT: Bonifas, Jeanette
; TITLE OF INVENTION: Mutant Human Hedgehog Gene
; CURRENT APPLICATION DATA:
; APPLICATION NUMBER: US/08/748,591
; FILING DATE:
; CLASSIFICATION: 435
; INFORMATION FOR SEQ ID NO: 4:
; SEQUENCE CHARACTERISTICS:
; LENGTH: 462 amino acids
; TYPE: amino acid
; STRANDEDNESS: single
; TOPOLOGY: linear
; MOLECULE TYPE: peptide
US-08-748-591-4

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Query Match          79.5%; Score 667; DB 2; Length 462;
Best Local Similarity 75.0%; Pred. No. 7.8e-80;
Matches 132; Conservative 29; Mismatches 13; Indels 2; Gaps 2;

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Qy      1 CGPGRGPVGRRRYARKQLVPLLYKQFVPGVPERTLGASGPAEGRVARGSERFRDLVPNYN 60
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Db      24 CGPGRG-FGKRRHPKK-LTPLAYKQFIPNVAEKT LGASGRYEGKISRNSERFKELTPNYN 81

Qy      61 PDIIFKDEENSGADRLMTERCKERVNALAIAMNMWPGVRLRVTEGWDEDGHHAQDSLHY 120
        |||||:|||||:|||||:||||:||||:|  |||:|||||:|||||:||||:||||
Db      82 PDIIFKDEENTGADRLMTQRCKDKLNALAI SVMNQWPGVKLRVTEGWDEDGHHSEESLHY 141

Qy     121 EGRALDITTS DRDRNKYGLLARLAVEAGFDWVYYESRNHIHVSVKADNSLAVRAGG 176
        |||:|||||:||||:|||||:|||||:|  ||  |||:|:|  ::|
Db     142 EGRAVDITTS DRDRSKYGMRLARLAVEAGFDWVYYESKAHIHCSVKAENSVAAKSGG 197

```

```
; Sequence 20, Application PC/TUS9515923
; GENERAL INFORMATION:
;   APPLICANT: The Johns Hopkins University School of Medicine, et al.
;   TITLE OF INVENTION: NOVEL HEDGEHOG-DERIVED POLYPEPTIDES
;   NUMBER OF SEQUENCES: 20
;   FILING DATE: 04-DEC-1995
;   INFORMATION FOR SEQ ID NO: 20:
;   SEQUENCE CHARACTERISTICS:
;     LENGTH: 437 amino acids
;     TYPE: amino acid
;     TOPOLOGY: linear
;     MOLECULE TYPE: protein
PCT-US95-15923-20
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Query Match          79.5%; Score 667; DB 3; Length 437;
Best Local Similarity 75.0%; Pred. No. 7.2e-80;
Matches 132; Conservative 29; Mismatches 13; Indels 2; Gaps 2;
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Qy      1 CGPGRGPVGRRRRYARKQLVPLLYKQFVPGVPERTLGASGPAEGRVARGSERFRDLVPNYN 60
        ||||| |:|| ::| | || |||:| |:|:||||| ||::| |||:| |||
Db      25 CGPGRG-FGKRRHPKK-LTPLAYKQFIPNVAEKT LGASGRYEGKITRNSERFKELTPNYN 82

Qy     61 PDIIFKDEENSGADRLMTERCKERVNALAIAMNMWPGVRLRVTEGWDEDGHHAQDSLHY 120
        |||||:|||||:||||:||||:||||:||||:||||:||||:||||:||||:||||:||||
Db     83 PDIIFKDEENTGADRLMTQRCKDKLNALAISVMNQWPGVKLRVTEGWDEDGHHSEESLHY 142

Qy    121 EGRALDITTSRDRNKYGLLARLAVEAGFDWVYYESRNHIHVSVKADNSLAVRAGG 176
        |||:|||||:||||:||||:||||:||||:||||:||||:||||:||||:||||:||||
Db    143 EGRAVDITTSRDRSKYGMRLARLAVEAGFDWVYYESKAHIHCSVKAENSVAAKSGG 198
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W09617924 A2
W09616668 A1

Desert hedgehog protein precursor - mouse
 C;Species: Mus musculus (house mouse)
 C;Date: 06-Jan-1995 #sequence_revision 06-Jan-1995 #text_change 10-Sep-1997
 C;Accession: B49425
 R;Echelard, Y.; Epstein, D.J.; St-Jacques, B.; Shen, L.; Mohler, J.; McMahon, J.A.; McMahon, A.P.
 Cell 75, 1417-1430, 1993
 A;Title: Sonic hedgehog, a member of a family of putative signaling molecules, is implicated in the regulation of CNS polarity.
 A;Reference number: A49425
 A;Accession: B49425
 A;Status: preliminary
 A;Molecule type: DNA
 A;Residues: 1-396 <ECH>
 A;Cross-references: GB:X76292; NID:g443941; PID:g443942
 C;Genetics:
 A;Gene: Dhh

Query Match 98.7%; Score 828; DB 2; Length 396;
 Best Local Similarity 97.7%; Pred. No. 4.7e-84;
 Matches 172; Conservative 3; Mismatches 1; Indels 0; Gaps 0;

Qy	1	CGPGRGPVGRRRRYARKQLVPLLYKQFVPGVPERTLGASGPAEGRVARGSERFRDLVPNYN	60
Db	23	CGPGRGPVGRRRRYVRKQLVPLLYKQFVPSMPERTLGASGPAEGRVTRGSERFRDLVPNYN	82
Qy	61	PDIIFKDEENSGADRLMTERCKERVNALAIAMNMWPGVRLRVTEGWDEEDGHHAQDSLHY	120
Db	83	PDIIFKDEENSGADRLMTERCKERVNALAIAMNMWPGVRLRVTEGWDEEDGHHAQDSLHY	142
Qy	121	EGRALDITTSDDRDRNKYGLLARLAVEAGFDWVYYESRNHIHVSVKADNSLAVRAGG	176
Db	143	EGRALDITTSDDRDRNKYGLLARLAVEAGFDWVYYESRNHIHVSVKADNSLAVRAGG	198

ID 043323 PRELIMINARY; PRT; 396 AA.
AC 043323;
DT 01-JUN-1998 (TREMBLREL. 06, CREATED)
DT 01-JUN-1998 (TREMBLREL. 06, LAST SEQUENCE UPDATE)
DT 01-JUN-1998 (TREMBLREL. 06, LAST ANNOTATION UPDATE)
DE HEDGEHOG.
GN HEDGEHOG.
OS HOMO SAPIENS (HUMAN).
OC EUKARYOTA; METAZOA; CHORDATA; VERTEBRATA; MAMMALIA; EUTHERIA; PRIMATES;
OC CATARRHINI; HOMINIDAE; HOMO.
RN [1]
RP SEQUENCE FROM N.A.
RA TATE G., ENDO Y., MITSUYA T.;
RL SUBMITTED (FEB-1998) TO EMBL/GENBANK/DDBJ DATA BANKS.
DR EMBL; AB010994; D1025788; -.
DR EMBL; AB010581; D1025788; JOINED.
DR EMBL; AB010993; D1025788; JOINED.
SQ SEQUENCE 396 AA; 43577 MW; 8200C40F CRC32;

Query Match 99.8%; Score 837; DB 2; Length 396;
Best Local Similarity 99.4%; Pred. No. 7.1e-84;
Matches 175; Conservative 1; Mismatches 0; Indels 0; Gaps 0;

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Qy      1 CGPGRGPVGRRRYARKQLVPLLYKQFVPGVPERTLGASGPAEGRVARGSERFRDLVPNYN 60
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Db      83 PDIIFKDEENSGADRLMTERCKERVNALAIAMNMWPGVRLRVTEGWDEDGHHAQDSLHY 142

Qy     121 EGRALDITTSRDRNKYGLLARLAVEAGFDWVYYESRNHIHVSVKADNSLAVRAGG 176
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AC W79594; *COMPARISON TO SEQ ID NO:2*
DT 02-FEB-1999 (first entry)
DE Human Desert hedgehog protein.
KW Desert hedgehog; HuDHH; human; monoclonal antibody.
OS Homo sapiens.
FH Key Location/Qualifiers
FT Protein 1. .176
FT /label= Mat_protein
PN EP-874048-A2.
PD 28-OCT-1998.
PF 24-APR-1998; 303187.
PR 14-APR-1998; JP-117873.
PR 25-APR-1997; JP-121578.
PA (HAYB) HAYASHIBARA SEIBUTSU KAGAKU.
PI Ariyasu T, Nakamura S, Orita K;
DR WPI; 98-544642/47.
DR N-PSDB; V62394.
PT Human Desert hedgehog protein - and corresponding DNA and monoclonal
PT antibody
PS Claim 3; Page 22-23; 39pp; English.
CC This is the amino acid sequence of a precursor of a novel human
CC Desert hedgehog protein, as deduced from a cDNA clone (see V62394)
CC derived from cell line ARH-77 (ATCC CRL-1621). The mature form
CC (see W79593) of the hedgehog protein is also claimed, as are a
CC monoclonal antibody (MAb) that recognises the protein, a process
CC for producing the protein, and a method for detecting the protein.
CC The hedgehog protein is useful in establishment of hybridomas which
CC produce antibodies recognising the protein, and the MAb is useful
CC for detecting and purifying the protein. The hedgehog protein,
CC DNA and MAb can be used to elucidate hereditary morphological
CC abnormalities in humans to establish their treatments and diagnoses.
SQ Sequence 374 AA;

Claim 4 = 100%
NO:3

Query Match 100.0%; Score 1805; DB 1; Length 374;
Best Local Similarity 100.0%; Pred. No. 6e-197;
Matches 374; Conservative 0; Mismatches 0; Indels 0; Gaps 0;

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Db 1 CGPGRGPGVRRRRYARKQLVPLLYKQFVPGVPERTLGASGPAEGRVARGSERFRDLVPNYN 60

Qy 61 PDIIFKDEENSGADRLMTERCKERVNALAIAMNMWPGVRLRVTEGWDEDGHHAQDSLHY 120
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Qy 121 EGRALDITTSRDRNKYGLLARLAVEAGFDWVYYESRNHIHVSVKADNSLAVRAGGCFFPG 180
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Qy 181 NATVRLWSGERKGLRELHRGDWVLTADASGRVVPTPVLLFLDRDLQRRASFVAVETEWPP 240
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Db 301 GVFAPLTAHGTLLVNDVLASCYAVLESHQWAHRAFAPLRLLHALGALLPGGAVQPTGMHW 360

Qy 361 YSRLLYRLAEELG 374
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Db 361 YSRLLYRLAEELG 374

AC 043323; COMPARISON TO SEQ ID NO:2
 01-JUN-1998 (TREMBLREL. 06, CREATED)
 DT 01-JUN-1998 (TREMBLREL. 06, LAST SEQUENCE UPDATE)
 DT 01-JUN-1998 (TREMBLREL. 06, LAST ANNOTATION UPDATE)
 DE HEDGEHOG.
 GN HEDGEHOG.
 OS HOMO SAPIENS (HUMAN).
 OC EUKARYOTA; METAZOA; CHORDATA; VERTEBRATA; MAMMALIA; EUTHERIA; PRIMATES;
 OC CATARRHINI; HOMINIDAE; HOMO.
 RN [1]
 RP SEQUENCE FROM N.A.
 RA TATE G., ENDO Y., MITSUYA T.;
 RL SUBMITTED (FEB-1998) TO EMBL/GENBANK/DDBJ DATA BANKS.
 DR EMBL; AB010994; D1025788; -.
 DR EMBL; AB010581; D1025788; JOINED.
 DR EMBL; AB010993; D1025788; JOINED.
 SQ SEQUENCE 396 AA; 43577 MW; 8200C40F CRC32;

Query Match 99.7%; Score 1800; DB 2; Length 396;
 Best Local Similarity 99.5%; Pred. No. 1.5e-159;
 Matches 372; Conservative 2; Mismatches 0; Indels 0; Gaps 0;

Qy	1	CGPGRGPVGRRRYARKQLVPLLYKQFVPGVPERTLGASGPAEGRVARGSERFRDLVPNYN	60
Db	23	CGPGRGPVGRRRYARKQLVPLLYKQFVPGVPERTLGASGPAEGRVARGSERFRDLVPNYN	82
Qy	61	PDIIFKDEENSGADRLMTERCKERVNALAIAVMNMWPGVRLRVTEGWDEDGHHAQDSLHY	120
Db	83	PDIIFKDEENSGADRLMTERCKERVNALAIAVMNMWPGVRLRVTEGWDEDGHHAQDSLHY	142
Qy	121	EGRALDITTSRDRNKYGLLARLAVEAGFDWVYYESRNIHVSVKADNSLAVRAGGCFFPG	180
Db	143	EGRALDITTSRDRNKYGLLARLAVEAGFDWVYYESRNIHVSVKADNSLAVRAGGCFFPG	202
Qy	181	NATVRLWSGERKGLRELHRGDWVLTADASGRVVPTPVLLFLDRDLQRRASFVAVETEWPP	240
Db	203	NATVRLWSGERKGLRELHRGDWVLAADASGRVVPTPVLLFLDRDLQRRASFVAVETEWPP	262
Qy	241	RKLLLTTPWHLVFAARGPAPAPGDFAPVFARRLRAGDSVLAPGGDALRPARVARVAREEAV	300
Db	263	RKLLLTTPWHLVFAARGPAPAPGDFAPVFARRLRAGDSVLAPGGDALRPARVARVAREEAV	322
Qy	301	GVFAPLTAHGTLVNDVLASCYAVLESHQWAHRAFAPLRLHALGALLPGGAVQPTGMHW	360
Db	323	GVFAPLTAHGTLVNDVLASCYAVLESHQWAHRAFAPLRLHALGALLPGGAVQPTGMHW	382
Qy	361	YSRLLYRLAEELG	374
Db	383	YSRLLYRLAEELG	396

LOCUS (LOC): AB010581S3 GenBank (R)
 GenBank ACC. NO. (GBN): AB010994
 CAS REGISTRY NO. (RN): 204280-14-8
 SEQUENCE LENGTH (SQL): 626
 5 MOLECULE TYPE (CI): DNA; linear
 DIVISION CODE (CI): Primates
 DATE (DATE): 14 Feb 1998
 DEFINITION (DEF): ***Homo*** sapiens hedgehog gene, exon 3 and
 complete cds.
 10 KEYWORDS (ST): hedgehog
 SEGMENT: 3 of 3
 SOURCE: ***Homo*** sapiens DNA.
 ORGANISM (ORGN): ***Homo sapiens***
 Eukaryotae; Metazoa; Chordata; Vertebrata; Mammalia;
 15 Eutheria; Primates; Catarrhini; Hominidae;
 Homo
 NUCLEIC ACID COUNT (NA): 73 a 200 c 236 g 117 t
 REFERENCE: 1 (bases 1 to 626)
 AUTHOR (AU): Tate,G.; Endo,Y.; Mitsuya,T.
 20 TITLE (TI): ***Human*** ***Desert*** ***Hedgehog*** ,
 third exon
 JOURNAL (SO): Published Only in DataBase (1998) In press
 REFERENCE: 2 (bases 1 to 626)
 AUTHOR (AU): Tate,G.; Endo,Y.; Mitsuya,T.
 25 TITLE (TI): Direct Submission
 JOURNAL (SO): Submitted (09-FEB-1998) to the DDBJ/EMBL/GenBank
 databases. Genshu Tate, Showa University Fujigaoka
 Hospital, Department of Surgical Pathology; Fujigaoka
 1-30, Aoba-ku, Yokohama, Kanagawa 227-8501, Japan
 30 (E-mail:six10352@super.win.or.jp, Tel:81-45-974-6632,
 Fax:81-45-972-6242)

FEATURES (FEAT):

Feature Key	Location	Qualifier
source	1..626	/organism="Homo sapiens"

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      CKERNALAIAMNMWPGVRLRVTEGWDEDGHHA
      QDSLHYEGRALDITTSRDRNKYG
15      LLARLAVEAGFDWVYYESRNVHVSVKADNSLAV
      RAGGCFPGNATVRLWSGERKGLRE
      LHRGDWVLAADASGRVVPTPVLLFLDRDLQRRAS
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      RGPAPAPGDFAPVFARRLRAGDSVLAPGGDALRP
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exon      1..626 /gene="hedgehog"
          /number=3

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SEQUENCE (SEQ):

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121 atgcgtcagg cggggtggtg cccacgccgg tgctgctctt cctggaccgg gacttgcagc
30 181 gccggggttc atttgtggct gtggagaccg agtggcctcc acgcaaactg ttgctcacgc
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301 tgttcgcgcg cgggctacgc gctggggact cgggtgctggc gcccggcggg gatgcgcttc
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35 481 gtcaccagtg ggcgcaccgc gcttttgccc ccttgagact gctgcacggc ctaggggcgc
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601 gcttagcgga ggagctactg ggctga

US PAT NO: 5,759,811 [IMAGE AVAILABLE]

L7: 1 of 1

SUMMARY:

BSUM(14)

The . . . The gene is located on human chromosome 2pter, and has the genome database accession number GDB:511203. A partial sequence of **human desert hedgehog** (hDHH) mRNA, has the Genbank Accession number U59748.

=> d fro

US PAT NO: 5,759,811 [IMAGE AVAILABLE]

L7: 1 of 1

DATE ISSUED: Jun. 2, 1998

TITLE: Mutant human hedgehog gene

INVENTOR: Ervin Epstein, Orinda, CA

Zhilan Hu, San Francisco, CA

Jeanette Bonifas, San Francisco, CA

ASSIGNEE: The Regents of the University of California, Oakland, CA
(U.S. corp.)

APPL-NO: 08/748,591

DATE FILED: Nov. 13, 1996

INT-CL: [6] C12P 21/06; C12N 15/00; C07K 1/00; C07H 21/02

US-CL-ISSUED: 435/69.1, 320.1; 530/350; 536/23.1; 935/22

US-CL-CURRENT: 435/69.1, 320.1; 530/350; 536/23.1

SEARCH-FLD: 435/69.1, 320.1; 530/350; 536/23.1; 935/22

REF-CITED:

OTHER PUBLICATIONS

Oro et al. (1997) Basal cell carcinoma in mice overexpressing sonic hedgehog. Science 276: 817-821, May 2, 1997.

Fan et al. (1997) Induction to basal cell carcinoma features in transgenic human skin expressing sonic hedgehog. Nature Medicine 3 (7): 788-792, Jun. 1997.

Rudinger (1976) Characteristics of the amino acid components of a peptide hormone sequence. In: Peptide Hormones, Ed. J. A. Parsons, University Park Press, Baltimore, MD, pp. 1-7, Jan. 1976.

Gailani et al. (1996) The role of the human homologue of Drosophila patched in sporadic basal cell carcinomas. Nature Genetics 14: 78-81, Sep. 14, 1998.

Roessler et al. (1996) Mutations in the human Sonic hedgehog gene cause holoprosencephaly. Nature Genetics 14: 357-360, Nov. 14, 1996.

Marigo et al. (1995) Cloning, expression and chromosomal location of SHH and IHH: Two human homologues of the Drosophila segment polarity gene hedgehog. Genomics 28: 44-51 Jul. 1, 1995.

Hahn et al. (1996) Mutations of the human homolog of Drosophila patched in the nevoid basal cell carcinoma syndrome. Cell 85: 841-851, Jun. 14, 1996.

Hammerschmidt et al. (1997) The World according to hedgehog. Trends in Genetics 13(1): 14-21, Jan. 1, 1997.

Stone et al. (1996) The tumor-suppressor gene patched encodes a candidate receptor for Sonic hedgehog. Nature 384: 129-134, Nov. 14, 1996.

Ogura et al. (1996) Evidence that Shh cooperates with a retinoic acid inducible co-factor to establish ZPA-like activity. Development 122: 537-542, Feb. 1996.

ART-UNIT: 184

Comparison of mouse DHH of patent with SEQ ID NO:6

AR021199

LOCUS	AR021199	1190 bp	DNA	PAT	04-DEC-1998
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DEFINITION Sequence 3 from patent US 5789543.

ACCESSION AR021199

NID g3975814

KEYWORDS .

SOURCE Unknown.

ORGANISM Unknown.

Unclassified.

AUTHORS Ingham, P.W., McMahon, A.P. and Tabin, C.J.

TITLE Vertebrate embryonic pattern-inducing proteins and uses related thereto

JOURNAL Patent: US 5789543-A 3 04-AUG-1998;

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Best Local Similarity 88.2%; Pred. No. 5.3e-160;

Matches 1048; Conservative 0; Mismatches 140; Indels 0; Gaps 0;

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QY 361 GTGCGCCTACGAGTGACTGAGGGCTGGGACGAGGACGGCCACCACGCTCAGGATTCACTC 420
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QY 421 CACTACGAAGGCCGTGCTTTGGACATCACTACGTCTGACCGCGACCGCAACAAGTATGGG 480

Db 421 CACTACGAAGGCCGTGCCTTGGACATCACCACGTCTGACCGTGACCGTAATAAGTATGGT 480

LOCUS (LOC): AB010581S3 GenBank (R)
 GenBank ACC. NO. (GBN): AB010994
 CAS REGISTRY NO. (RN): 204280-14-8
 SEQUENCE LENGTH (SQL): 626
 5 MOLECULE TYPE (CI): DNA; linear
 DIVISION CODE (CI): Primates
 DATE (DATE): 14 Feb 1998
 DEFINITION (DEF): ***Homo*** sapiens hedgehog gene, exon 3 and
 complete cds.
 10 KEYWORDS (ST): hedgehog
 SEGMENT: 3 of 3
 SOURCE: ***Homo*** sapiens DNA.
 ORGANISM (ORGN): ***Homo sapiens***
 Eukaryotae; Metazoa; Chordata; Vertebrata; Mammalia;
 15 Eutheria; Primates; Catarrhini; Hominidae;
 Homo
 NUCLEIC ACID COUNT (NA): 73 a 200 c 236 g 117 t
 REFERENCE: 1 (bases 1 to 626)
 AUTHOR (AU): Tate,G.; Endo,Y.; Mitsuya,T.
 20 TITLE (TI): ***Human*** ***Desert*** ***Hedgehog***
 third exon
 JOURNAL (SO): Published Only in DataBase (1998) In press
 REFERENCE: 2 (bases 1 to 626)
 AUTHOR (AU): Tate,G.; Endo,Y.; Mitsuya,T.
 25 TITLE (TI): Direct Submission
 JOURNAL (SO): Submitted (09-FEB-1998) to the DDBJ/EMBL/GenBank
 databases. Genshu Tate, Showa University Fujigaoka
 Hospital, Department of Surgical Pathology; Fujigaoka
 1-30, Aoba-ku, Yokohama, Kanagawa 227-8501, Japan
 30 (E-mail:six10352@super.win.or.jp, Tel:81-45-974-6632,
 Fax:81-45-972-6242)

FEATURES (FEAT):
 Feature Key Location Qualifier
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15 361 ggccagcgcg cgtggcccgt gtggcgcggg aggaagccgt gggcgtgttc gcgccgctca
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LOCUS (LOC): HSU59748 GenBank (R)
 GenBank ACC. NO. (GBN): U59748
 CAS REGISTRY NO. (RN): 178296-28-1
 SEQUENCE LENGTH (SQL): 285
 5 MOLECULE TYPE (CI): mRNA; linear
 DIVISION CODE (CI): Primates
 DATE (DATE): 4 Jul 1996
 DEFINITION (DEF): ***Human*** ***desert*** ***hedgehog***
 (hDHH) mRNA, partial cds.
 10 SOURCE: ***human***
 ORGANISM (ORGN): ***Homo sapiens***
 Eukaryotae; mitochondrial eukaryotes; Metazoa;
 Chordata; Vertebrata; Eutheria; Primates; Catarrhini;
 Hominidae; ***Homo***
 15 NUCLEIC ACID COUNT (NA): 62 a 73 c 92 g 58 t
 REFERENCE: 1 (bases 1 to 285)
 AUTHOR (AU): Drummond, I.A.
 TITLE (TI): ***Human*** ***desert*** ***hedgehog***
 JOURNAL (SO): Unpublished
 20 REFERENCE: 2 (bases 1 to 285)
 AUTHOR (AU): Drummond, I.A.
 TITLE (TI): Direct Submission
 JOURNAL (SO): Submitted (02-JUN-1996) Renal Unit, Mass. General
 Hospital, 149 13th street, Charlestown, MA 02129, USA
 25 FEATURES (FEAT):

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 121 gagtgactga gggctgggac gaggacggcc accacgctca ggattcactc cactacgaag
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 241 gcctcgcagt ggaagccggc ttgactggg tctactacgg atccg

Corresponds to aa 63 → 156 of SEQ ID NO:7